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Control of Yellow Streak Mosaic of Winter Wheat

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Yellow streak mosaic of winter wheat caused heavy losses in yield in 1959. The loss was estimated at well over a million dollars. The damage ranged from a trace in some fields to a complete loss in others. Some fields were plowed down in midseason when it became evident that 100 percent of the plants in the field were severely diseased, yellowed, stunted and no yield would result.

Table 1 presents the experimental results obtained at the South Central Research Farm at Presho in 1959. By carefully studying the information, the table will provide valuable suggestions in reducing the losses which can occur from an attack by this destructive plant disease.

The dry, hot summer of 1959 kept yields low. In addition, on July 13, a damaging hail storm at the South Central Research Farm knocked off approximately 50 percent of the heads. Therefore, the yields which are presented in Table 1 were probably reduced to one-half. In other words, if one were to multiply each yield figure by two that might more nearly represent what the yields would have been had no hail occurred.

In Table 1 are data taken on October 10, 1958 which indicates the stand and growth of plants at the six different dates of planting. The plantings went into the winter in excellent condition insofar as stand and good growth

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Table 1. EFFECT OF SEEDING DATE ON THE CONTROL OF THE YELLOW STREAK MOSAIC VIRUS DISEASE ON NEBRED WINTER WHEAT SOUTH CENTRAL RESEARCH FARM, PRESHO, SOUTH DAKOTA, 1959.

Seeding dates	Aug. 15	Aug. 25	Sept. 4	Sept. 14	Sept. 24	Oct. 4
Stand on Oct. 10, 1958	Excellent	Exc.	Exc.	Exc.	Good	Fair
Percent stand* on May 15, 1959	13	32	68	83	72	63
Percent mosaic* infected plants on May 15, 1959	97	95	65	8	6	1
Yield, Bu./A.*,**	.4	1.4	3.8	7.0	7.0	5.0

* Results based on three replications using a randomized block design.
** Damaging hail occurred on July 13, estimated loss in plot yield, 50 percent.

Table 2. Rainfall in inches during the growing season at the South Central Research Farm, Presho, 1959.

Rainfall in inches	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	1.7	2.0	2.6	1.6	.06	Tr.	.19	0

are concerned, with the possible exceptions of the last two dates of planting, made on September 24 and October 4.

However, the excellent stands which existed in the fall of 1958, were markedly reduced the following spring. This loss in stand or killing of the wheat plants during the winter months appears to be directly associated with the amount of virus infection in the plants which the plots at the various dates of planting had prior to freeze-up in the fall. In other words, those plants which were infected with the mosaic virus in early fall were more susceptible to winter injury and therefore died during the winter months.

It can be seen from the data in Table 1, that the spread of mosaic continued at a high rate until September 4 and then dropped off at a rapid rate, whereas on October 4 only one percent of the wheat plants were diseased.

Yields, as shown in Table 1, were very poor at the first three dates of planting but improved markedly in the September 14 and 24, even the late established planting sown on October 4 which was virtually mosaic free, produced good yields in comparison to the early plantings which were heavily infected with mosaic.

As is evident from the data in Table 1, the earlier plantings were exposed longer to infection and during a period when the weather was still warm and the mites which spread mosaic were still very actively feeding on the crop. Consequently with favorable conditions for the mite and the mosaic, the disease spread rapidly so that virtually all of the plants at the first and second dates of planting were 100 percent diseased. The mosaic apparently weakened the plants and much winter killing resulted leaving very poor stands; hence, little or no yield. Further, it should be noted that the disease was very low in plantings made on September 14 and 24 which made for good yields when compared to

the earlier plantings.

Table 2 provides information on the monthly rainfall during the growing season. The data indicated that although rainfall was short between July and freeze-up time, moisture was nevertheless adequate to provide good seed germination at all dates of planting, with the exception of the October 4 planting and this was probably associated with low temperatures rather than lack of moisture. Therefore, it appears that the poor stands which appeared the following spring were not associated with rainfall or poor soil moisture but rather to heavy mosaic infection which occurred primarily at the earlier dates of planting while the weather was warm and the mites still actively feeding and spread the disease. The infection weakened the plants and permitted winter killing or loss in stand by spring.

Discussion:

As a result of extensive field surveys in May and June, it was noted that in general in farmers' fields planted in August and the first few days in September mosaic was very destructive. This was true only if the field or fields were in areas where mosaic was present. Although the disease was not present in all fields, it occurred throughout the winter wheat growing region of the state. Since spring wheat is also equally susceptible to this disease, spring wheat fields planted in the winter wheat area were also damaged by this disease.

Field experiments conducted on the control of this disease near Dallas, South Dakota, in 1953 and 1954 confirmed the results obtained in 1959 at the South Central Research Farm. The Plant Pathology Department has recommended that planting winter wheat about the 10th of September gave the best control of this disease. In other words, proper date of planting is very important in

years when mosaic is present in the control of this destructive disease. However, the grower will want to base his decisions on when to plant, not only with regard to the disease problem on his particular farm, but also he should take into consideration soil moisture and erosion problems as well.

In addition to selecting a practical time to plant it is recommended the land be worked about a week to 10 days before planting to destroy all pigeon grass for the reason that pigeon grass also is highly susceptible to wheat mosaic and can serve to initiate and spread the disease under field conditions if it is not killed in advance of planting the wheat seed. A machine which undercuts and destroys the plants and yet leaves the plants on the surface to prevent soil blowing would seem to be most satisfactory.

From the yield results presented in Table 1, growers would have benefited by hundreds of thousands of dollars had they planted between September 10 and 15. On the other hand, many farmers who did plant on or about that date profited greatly in comparison to those who planted in August, if the field was in an area where mosaic was present.